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TILLETIA TEXANA IN MISSOURI

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While looking over smut collections in the herbarium of the Missouri Botanical Garden the writer came upon a collection on a wild grass, *Hordeum pusillum* Nutt., common in Missouri and in adjoining regions, which is of particular interest. This smut has apparently been reported only once before, from Texas, the type locality, and since the original description was based on but one collection a brief description of the Missouri material should be of some assistance in fixing the identity of this species as well as calling attention to a new host and a new locality.

This smut is of the covered type, the glumes remaining intact while the ovule is more or less completely replaced by the spore mass, and, like other smuts of the covered type, is apt to be overlooked. It was collected by C. H. Demetrio, near Emma, Saline County, Missouri, on June 20, 1896, and it is worth noting that while the host of the type collection is *Hordeum nodosum* L. (*H. pratense* Huds.) the collection under discussion is on *H. pusillum*.

Clinton's description of *Tilletia texana* Long (Jour. Myc. 8: 149. 1902), appearing also in the same author's monograph of the North American Ustilaginales, portrays well the collection at hand. The following additional notes may be of interest. The attacked ovules are considerably enlarged, often assuming two or three times the width of the normal kernels, and instead of appearing straw-colored they are of a grayish green external appearance. Internally they present an agglutinated light-reddish brown spore mass, as Clinton states. His description of the spores, including color, shape, markings, size, etc., might have been written for the Missouri material. I find the same characters that he describes. In addition it should be noted that the hyaline envelope is 2.5-3.5 μ thick and that many of

the spores show a small apiculus which at times is replaced by a slender thread-like, colorless hypha. This apiculus or slender thread simulates the aspects of a pedicel; at any rate, it is quite likely to be the point of attachment to the stromatic mass. Some of Lutman's figures (Trans. Wis. Acad. Sci. 16: 1191-1244. 1910), depicting the manner in which resting spores are developed in some smuts, would indicate that some such method of attachment of spore to the stroma is not uncommon. May this be regarded as a step culminating in the development of a true pedicel such as numerous rusts possess?

In Clinton's description it will be noted that he is not certain of the maturity of his material, and particularly in connection with the light orange-yellow color of the spores, he says: "Appearing as if somewhat immature." The Missouri material shows the same color and in the mind of the writer there is little doubt of the maturity of this material. In this region *Hordeum pusillum*, the host, is one of the grasses which appears early and usually matures during May or the first half of June. By the end of June this grass begins to disappear and is gradually supplanted by later developing grasses. As Demetrio's collection was made on June 20, there is little doubt that the host as well as the fungus must have reached maturity. The fact that other smuts, closely related to this species, are also light-colored should leave little doubt on this matter.

The relationship of *Tilletia texana* to other species is worthy of consideration. Besides this species four others of the genus *Tilletia* have been described on various species of *Hordeum*. They are *T. Hordei* Körn., *T. Trabuti* Jacz., *T. Panicicii* Bub. & Ranojevic, and *T. Bornmülleri* Magn. Clinton has already called attention to the difference between *T. texana* and *T. Hordei*, namely, the reticulate markings of spores of the latter species. The other species likewise are said to have reticulate spores besides other diagnostic characters which are not possessed by *T. texana*. Indeed, species on other host genera show greater similarity to this smut. Besides *T. buchloena*, mentioned by Clinton, *T. Wilcoxiana* Griffiths and perhaps *T. Rauwenhoffii* Fisch. de Waldh. are closely related. *Tilletia Wilcoxiana* on *Stipa Hassei* in particular deserves attention. Besides the

characteristic hyaline membrane the spores of this smut also are light-colored as well as possessing other features in common with *T. texana*. The differences as noted in material in the herbarium of the Missouri Botanical Garden (collected by H. E. Hasse at Los Angeles, Cal., April 5, 1895) are in the smaller markings and in the somewhat smaller-sized spores of *T. Wilcoxiana*. Whether these differences denote unlike species or merely influences of unlike hosts on the same species is a question. Without a larger number of collections and without cross-inoculation experiments it would perhaps be best to consider them as two distinct species.